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10/588,314	08/03/2006	Yasuharu Kanno	293009US40PCT	5762
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			EXAMINER CULLEN, SEAN P	
			ART UNIT 4133	PAPER NUMBER
			NOTIFICATION DATE 06/01/2009	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	Application No. 10/588,314	Applicant(s) KANNO ET AL.	
	Examiner Sean P. Cullen	Art Unit 4133	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/03/2006</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claim 15 is objected to because of the following informalities: In line 2, “generator derive device” should recite “generator drive device.” Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

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invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 2 4-6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bampton (U.S. 5,697,511) in view of Murr et al. (Journal of Material Science Letter 16 (1997) 1801-1803).

Regarding claim 1, Bampton discloses a process for fabricating a pressure vessel liner (see cylindrical tank, abstract) comprising:

- a tubular trunk (6) and
- two head plates (4, 12) for closing opposite end openings of the trunk (Fig. 2)
- at least two liner components (6; as described in the instant application the first liner component provides the trunk, Fig. 3 of the instant application; **4, 12**; the second liner components provide the head plates, Fig. 3 of the instant application) so shaped as to resemble the liner as divided into segments longitudinally thereof (Fig. 1),
- the process including bringing two adjacent liner components (6, 12) into contact with each other,
- placing a probe (24) of a friction agitation joining tool (20) into the two liner components (6, 12) while rotating (26) the probe (24)
- to thereby move the probe (24) along the contact portions (18) over the entire circumference thereof and (C3/L1-8)
- join the two liner components (6, 12) to each other by friction agitation (see stir friction welding, abstract)

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Bampton does not explicitly disclose:

- the process being characterized in that assuming that the number of revolutions of the probe R rpm and that the speed of joining of the two liner components is V mm/min,  $R/V$  is in the range of  $2 \leq R/V \leq 12$ .

Murr et al. discloses in the process of friction agitation joining (see friction-stir welding, P1801/C1/L1-5) the process being characterized in that assuming that the number of revolutions of the probe R ( $R$ , Fig. 1) rpm ( $\text{rev min}^{-1}$ ) and that the speed of joining of the two liner components is V ( $T$ , Fig. 1) mm/min ( $\text{mm s}^{-1}$ ),  $R/V$  is in the range of  $2 \leq R/V \leq 12$  ( $R/T = 400 \text{ rev s mm}^{-1} \text{ min}^{-1} = 6.67 \text{ rev mm}^{-1}$ , P1801/C2/L18-22) as the optimum conditions for the friction agitation welding (P1801/C2/L18-22) and prevent melting of the components (P1801/C1/L5-7). Bampton and Murr et al. are analogous art because they are directed to the friction agitation welding of two components. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the process of Bampton using the conditions of Murr et al. in order to obtain the optimum conditions for the friction agitation weld and prevent melting of the components.

Regarding claim 2, modified Bampton discloses all claim limitations set forth above as applied to claim 1 and further discloses a process for fabricating a pressure vessel liner:

- wherein  $R/V$  is in the range of  $2 \leq R/V \leq 8$ .

Murr et al. discloses wherein  $R/V$  is in the range of  $2 \leq R/V \leq 8$  ( $R/T = 6.67 \text{ rev mm}^{-1}$ , P1801/C2/L18-22) as pointed out above.

Regarding claim 4, modified Bampton discloses all claim limitations set forth above as applied to claim 1 and further discloses a process for fabricating a pressure vessel liner:

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- wherein the contact portions (18) of the two liner components (6, 12) are joined by friction agitation through at least 360 circumferentially thereof (Fig. 1 and Fig. 2).

Regarding claim 5, modified Bampton discloses all claim limitations set forth above as applied to claim 1 and further discloses a process for fabricating a pressure vessel liner:

- wherein all the liner components are made of aluminum (C2/L10-12).

Regarding claim 6, modified Bampton discloses all claim limitations set forth above as applied to claim 1 and further discloses a process for fabricating a pressure vessel liner:

- preparing a first liner component (6) having a tubular peripheral wall (6)
- having opposite end openings (Fig. 1) for providing the trunk (6)
- two second liner components (4, 12) each having a dome-shaped peripheral wall (Fig. 1)
- for providing the respective head plates (4, 12), and
- joining the peripheral walls of the first liner component (6) and the second liner components (4, 12) by friction agitation (see stir friction welding, abstract)

Regarding claim 8, modified Bampton discloses all claim limitations set forth above as applied to claim 1 and further discloses:

- a pressure vessel (see cylindrical tank, abstract) fabricated by a process according to claim 1 (see claim 1 above).

5. Claims 3, 7, 9-10, 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bampton (U.S. 5,697,511) in view of Murr et al. (Journal of Material Science Letter 16

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(1997) 1801-1803) as applied to claims 1, 2, 4-6 and 8 above, and further in view of Kobayashi (JP 09-042595).

Regarding claim 3, modified Bampton discloses all claim limitations set forth above as applied to claim 1, but does not explicitly disclose a process for fabricating a pressure vessel liner:

- wherein the contact portions of the two liner components are 0.5 to 20 mm in wall thickness.

Kobayashi discloses a process for fabricating a pressure vessel liner (2) wherein the contact portion of the two liner components (3, 4) are 0.5 to 20 mm in wall thickness (1 to 2 mm, [0009]) in order to maintain ease of manufacture and decreased weight [0006]. Kobayashi, Bampton and Murr et al. are analogous art because they are directed to the joining of metal, specifically aluminum. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the pressure vessel of modified Bampton using the thickness of Kobayashi in order to balance the ease of manufacture and weight.

Regarding claim 7, modified Bampton discloses all claim limitations set forth above as applied to claim 6 and further discloses a process for fabricating a pressure vessel liner:

- wherein the first liner component is made from aluminum by extrusion, and the second liner components are made from aluminum by forging.

Kobayashi further discloses a process for fabricating a pressure vessel liner wherein the first liner component (3) is made from aluminum by extrusion [0014], and the second liner components (4, 5) are made from aluminum by forging [0013] in order to control the thickness of the component while retaining the structural integrity [0014]. Therefore, it would have been

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obvious to one of ordinary skill in the art at the time of the invention to use the process of modified Bampton with the first and second liner components of Kobayashi in order to retain structural integrity of the components while reducing to an optimum thickness.

Regarding claims 9 and 10, modified Bampton discloses all claim limitations set forth above as applied to claim 8, but does not explicitly disclose a pressure vessel further comprising:

- a fiber reinforced resin layer covering an outer peripheral surface of the liner.
- wherein the fiber reinforced resin layer comprises a helically wound fiber layer formed by winding a reinforcing fiber around the trunk longitudinally thereof and partly around the head plates,
- a hoped fiber layer made by winding a reinforcing fiber around the trunk circumferentially thereof and
- a resin impregnating the fibers layers and cured

Kobayashi further discloses a pressure vessel (1) comprising a pressure vessel liner (2) and a fiber reinforced resin layer (17 and 18) covering an outer peripheral surface of the liner (2) in order to reinforce the pressure vessel liner [0011]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the pressure vessel of modified Bampton using the fiber reinforced resin layer of Kobayashi to reinforce the pressure vessel liner and bear some of the internal pressure.

Kobayashi further discloses a pressure vessel (1) wherein the fiber reinforced resin layer (17 and 18) comprises a helically wound fiber layer (17) formed by winding a reinforcing fiber around the trunk longitudinally thereof (Drawing 3) and partly around the head plates (4 and 5), a hoped fiber layer (18) made by winding a reinforcing fiber around the trunk circumferentially

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thereof (Drawing 3) and a resin impregnating the fibers layers and cured [0011] in order to reinforce the pressure vessel liner [0011] in order to reinforce the pressure vessel liner.

Regarding claim 14, modified Bampton discloses all claim limitations set forth above as applied to claim 9, but does not explicitly disclose natural gas system comprising:

- a natural gas pressure vessel and
- pressure piping for sending out natural gas from the pressure vessel therethrough

Kobayashi further discloses a natural gas system comprising a natural gas pressure vessel (1) and pressure piping [0015] for sending out natural gas from the pressure vessel therethrough in order to reduce cost and weight of the pressure vessel [0007]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the pressure vessel of modified Bampton to make the natural gas system of Kobayashi using in order to reduce cost and weight of the pressure vessel.

Regarding claim 17, further modified Bampton discloses all claim limitations set forth above as applied to claim 14 and further discloses a (oxygen) gas supply system comprising:

- an pressure vessel (1) and
- pressure piping for sending out gas from the pressure vessel therethrough [0015],
- the pressure vessel comprising a pressure vessel according to claim 9 (see claim 9 above).

6. Claims 11-13 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bampton (U.S. 5,697,511) in view of Murr et al. (Journal of Material Science Letter 16 (1997) 1801-1803) and further in view of Kobayashi (JP 09-042595) as applied to claims 3, 7, 9-10, 14 and 17 above, and further in view of Faye et al. (U.S. 2004/0033402).

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Regarding claim 11, modified Bampton discloses all claim limitations set forth above as applied to claim 9, but does not explicitly disclose a fuel cell system comprising:

- a pressure vessel,
- a fuel cell and
- pressure piping for sending gas from the pressure vessel to the fuel cell therethrough,
- the pressure vessel comprising a pressure vessel according to claim 9.

Faye et al. discloses a fuel cell system comprising a fuel hydrogen pressure vessel (2), a fuel cell (1) and pressure piping (T<sub>1</sub>) for delivering fuel hydrogen gas from the pressure vessel to the fuel cell therethrough (Fig. 1). Faye et al. does not explicitly disclose a fuel hydrogen pressure vessel comprising a pressure vessel according to claim 9. Further modified Bampton and Faye et al. are analogous art because they are directed to high pressure vessels. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make fuel cell system of Faye et al. with the pressure vessel of further modified Bampton in order to reduce the cost and weight of the pressure vessel.

Regarding claim 12, Faye et al. further discloses a fuel cell motor vehicle having installed therein a fuel cell system [0025]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make a fuel cell motor vehicle of Faye et al. using pressure vessel of further modified Bampton.

Regarding claim 13, Faye et al. further discloses a cogeneration system comprising a fuel cell system according to claim 11 (see claim 11 above). Therefore, it would have been obvious

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to one of ordinary skill in the art at the time of the invention to make cogeneration system of Faye et al. with the pressure vessel of further modified Bampton.

Regarding claim 15, further modified Bampton discloses all claim limitations set forth above as applied to claim 14 and further discloses a cogeneration system comprising:

- a natural gas supply system according to claim 14 (see claim 14 above),

Further modified Bampton does not explicitly disclose:

- a generator and
- a generator drive device.

Faye et al. further discloses a generator and a generator drive device (see engine, [0025]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the cogeneration system of Faye et al. with the pressure vessel of further modified Bampton.

Regarding claim 16, further modified Bampton discloses all claim limitations set forth above as applied to claim 14 and further discloses:

- a natural gas supply system according to claim 14 (see claim 14 above) and

Further modified Bampton does not explicitly disclose:

- an engine for use with natural gas as a fuel.

Faye et al. discloses an engine for use with a natural gas as a fuel [0025]. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make a natural gas motor vehicle of Faye et al. with the pressure vessel of further modified Bampton.

### ***Double Patenting***

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or

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improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1-2, 8, 9, and 11-16 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4, 9, and 20-26 of copending Application No. 10/587849 in view of Murr et al. (Journal of Material Science Letter 16 (1997) 1801-1803).

Claims 4, 9, and 20-26 of the copending application, 10/587849 recite all of the limitations as recited in claim 1-2, 8, 9, and 11-16 of the instant application, but they do not explicitly disclose the process being characterized in that assuming that the number of revolutions of the probe R rpm and that the speed of joining of the two liner components is V mm/min,  $R/V$  is in the range of  $2 \leq R/V \leq 12$ .

Murr et al. discloses  $R/V$  is in the range of  $2 \leq R/V \leq 12$  ( $R/T = 400 \text{ rev s mm}^{-1} \text{ min}^{-1} = 6.67 \text{ rev mm}^{-1}$ , P1801/C2/L18-22) as the optimum conditions for the friction agitation welding (P1801/C2/L18-22). 10/587849 and Murr et al. are analogous art because they are directed to the joining of two work pieces using a friction agitation tool. Therefore, it would have been

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obvious to one of ordinary skill in the art at the time of the invention to use the process of 10/587849 with the conditions of Murr et al. in order to produce a strong and defect-free weld.

Therefore claims 1-2, 8, 9, and 11-16 of the instant application are directed to an invention not patentably distinct from claim 4, 9, and 20-26 of commonly assigned copending application 10/587849 as set forth above.

This is a provisional obviousness-type double patenting rejection.

### ***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Cullen whose telephone number is 571-270-1251. The examiner can normally be reached on Monday thru Thursday 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/S. P. C./

Examiner, Art Unit 4133

/Barbara L. Gilliam/

Supervisory Patent Examiner, Art Unit 4133